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Science-Learning Strengthening Model in Islamic Educational Institution: Case Study at MAN 1 Yogyakarta

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Abstract

Advances in science and technology continue to develop and have a broad impact on various aspects of human life, including in the world of education. In order for students to be able to compete in the global world, educational institutions need to strengthen science learning to students. This study aims to explore the advantages of the science-learning strengthening model in Madrasa Aliyah in terms of context, input, process, and output aspects. This study uses a qualitative approach with a qualitative descriptive method. The results of this study indicate that in terms of context, the program for strengthening science learning already exists in the vision and mission of the madrasa, which is to have the advantage of science and technology, which is followed up by madrasa policy to develop KTSP Research and science for local contents and extracurricular activities. From the input side, all were fulfilled except for the laboratory staff who were temporarily carried out by the KIR Trustees. From the process side, science learning strengthening has been carried out well and the output is also quite satisfiying. This can be seen from the score of the National Examination and the number of student achievements, especially in the fields of science and research both in the national and international levels.

Keywords: *Model, Strengthening, Science learning, Madrasa*

Abstrak

Kemajuan ilmu pengetahuan dan teknologi terus berkembang dan berdampak luas terhadap berbagai aspek kehidupan manusia, termasuk dalam dunia pendidikan. Agar peserta didik mampu bersaing di dunia global maka lembaga pendidikan perlu menberikan penguatan pembelajaran sains pada peserta didik. Penelitian ini bertujuan untuk mengekplorasi keunggulan model penguatan pembelajaran sains di madrasah Aliyah dilihat dari aspek konteks, input, proses, output. Penelitian ini menggunakan pendekatan kualitatif dengan metode deskriptif kualitatif. Hasil penelitian ini menunjukkan bahwa dari sisi konteks, program penguatan pembelajaran sain sudah ada dalam visi dan misi madrasah yaitu memiliki keunggulan ilmu pengetahuan dan teknologi, yang ditindaklanjuti dengan kebijakan madrasah untuk menyusun KTSP Riset dan sains untuk mulok dan kegiatan ekstrakurikuler. Dari sisi input, semua terpenuhi kecuali tenaga laboran yang sementara dilakukan oleh Pembina KIR. Dari sisi proses, Penguatan pembelajaran

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sains sudah berjalan dengan baik dan outputnya juga cukup memuaskan. Hal ini terlihat dari nilai Ujian Nasional dan banyaknya prestasi siswa khususnya dibidang sains dan riset baik di tingkat nasional maupun internasional.
Keywords: Model, Penguatan, Pembelajaran Sains, Madrasah

Introduction

Science is knowledge that humans learn which includes everything that can be accepted by the human senses, such as the sense of sight or the sense of hearing. Science can be divided into natural science and social science. Science is also knowledge obtained from the learning process and evidence as well.

In the 21st century, the development of science is growing rapidly, especially information and communication technology. Learning methods are needed that can prepare students to be literate in science and technology, able to think logically, critically, creatively, and can argue correctly. According to Sukro Muhab in Mulya Sari (Sari, 2012) every 5 minutes international research journals publish new discoveries in the field of science and technology. The lag in access to science in learning in Indonesia is fundamentally caused by two things, firstly the operational mastery of teachers on information technology tools, secondly because not all schools are able to meet the availability of information technology tools that are able to provide adequate access to global information, such as the internet network. This is also caused by other fundamental factors, namely the quality of human resources and financial availability (Sari, 2012).

In general, the achievement of science teaching in Indonesia has not been encouraging. An international survey shows that the ability of our students in the 2015 TIMSS is in the order of 44 out of 49 participating countries for mastery of science and mathematics subjects with an average score of 397. Likewise, the results of the 2018 PISA study released by the OECD shows that the ability of Indonesian students to read, achieved an average score of 371, with an average OECD score of 487. Then for mathematics, the average score reached 379 with an OECD average score of 487. Furthermore, for science, the average score the average Indonesian student reaches 389 with an OECD average score of 489 (Mustusilo, 2019a).

According to Lufri (Milyasari, 2013), some phenomena often seen in science learning are: Teachers' learning strategies are less precise, less varied (less professional); The teaching style of the teacher is not pleasing to the students; The teacher's affection cannot be imitated; The implementation of teacher duties (as educators, instructors and trainers) has not run optimally; The teacher's ability to determine and present

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essential material is relatively lacking; Too many tasks for students; Relying on worksheets sold by certain publishers (supposed to be made by teachers); Lack of discipline implementation for children; Science is presented theoretically, has not used the laboratory optimally. This means that teachers have not taught in a professional way yet, unable to apply the four competencies of teachers. Meanwhile, Yulaelawati (in Milyasari, 2011) stated that the problems and issues in science education are: science teachers are less competent, unable to demonstrate the science process in classroom learning (especially elementary school).

Research on Portraits of Science Learning in Middle and High Schools conducted by Wijayanto et al in 2012 showed that generally science learning tends to be monotonous with low science activities. Teachers tend to lecture or explain, students listen and take notes, and laboratory activities are rarely carried out. In addition, in general the perceptions of teachers and students tend to lead that the success of science learning depends on the curriculum, resources, learning environment, teaching effectiveness, and evaluation strategies. (Wijayanto & Wibowo, 2006).

The government has made efforts to make improvements in order to improve the quality of science education in madrasa, including the Madrasa Science Competition (MSC). According to the Director of Curriculum, Facilities, Institutions and Student Affairs, Ahmad Umar, MSC is a strategic event in order to develop the talents, competencies, and achievements of young people as well as to develop superior character, integrity, sportsmanship, and intellectuality that are needed in an increasingly competitive era (Islam, 2019). This competition is not the only debut of madrasa students in the arena of science competition. In the National Science Olympiad, madrasa students have also won many prestigious awards, even though they compete directly with public schools.

In addition to the science competition, the "Madrasa Young Researcher Camp" was also conducted which presented and showed an exhibition of research results of science, social and religion for madrasa students throughout Indonesia. A total of 1018 proposals have been received and 54 research titles have been selected to participate in the madrasa research expo. Their diverse discoveries from various fields are the embryo of a great work that is expected to change world civilization (Mustusilo, 2019b).

From the description above, it can be concluded that the progress of science and technology continues to develop and has a broad impact on various aspects of human life, including in the world of education. Students

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are expected to be able to follow the development of science and technology so that they can compete in the global world. However, in reality, there is still a long way to go to succeed, especially for madrasa students. Nationally, the average learning outcomes in science (social and natural) of students in madrasa, especially at the Aliyah (MA) level, are still low. From the list of the best 100 high schools based on the 2019 National Examination results, only 4 MA entered the best category, namely MAN IC Serpong, MAN IC Gorontalo, MAN IC Pekalongan and MAN 2 Malang, East Java ((biem.co), 2019). However, individually, there are several madrasa students who are able to achieve national and even international achievements.

Several madrasas have innovated in organizing science learning with excellence, which is shown by the increasing achievements of madrasas in science and technology either through the National Science Olympiad, Madrasa Science Competition, scientific work competition/research innovation, and other similar activities. One of them is MAN 1 Yogyakarta. MAN 1 Yogyakarta is a madrasa that has been designated as an Excellent Madrasa Pioneer based on the Decree of the Head of the Regional Office of the Ministry of Religion of the Special Region of Yogyakarta Number 609 b of 2012, in line with the achievements, both at national and international levels, especially in the academic and research fields. Therefore, the advantages of science learning in madrasa needs to be benchmarked into a role model which can be adopted and adapted later in strengthening science learning and socialized to other madrasas so they can carry out science learning with superior outcomes.

Related to this, it is necessary to reveal how the model of strengthening science learning in madrasas is considered superior as best practice, especially at the Madrasa Aliyah level. This study aims to explore the advantages of science-learning strengthening model in Madrasa Aliyah in terms of context, input, process, and output aspects as well as the outcome of strengthening science learning.

Research Method

This study uses a qualitative approach to describe and analyze phenomena, social activity events, attitudes, beliefs, perceptions, and human thoughts individually and in groups. Qualitative research is inductive, meaning that this research allows problems to emerge from the data or is left open to interpretation (Ghony & Almanshur, 2016).

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The research method used is descriptive qualitative, namely research directed at providing symptoms, facts or events systematically and accurately regarding the characteristics of a particular population or area (Nurul, 2015). According to Sukmadinata (Sukmadinata, 2010) descriptive research has several variations, including developmental studies which can not only describe a situation, but can also describe the situation in its stages of development. Data collection techniques used are interview guidelines, documentation studies, and observation. Documentation is used as complementary data in fulfilling the information needed to answer research questions. The documentation study was conducted in order to provide an overview of the strengthening of science learning at MAN 1 Yogyakarta. While the interviews were directed to all respondents who could be considered qualified to provide views and assessments of strengthening science learning, namely the Principal, Vice Principal of MAN 1 Yogyakarta, Head of Administration, teachers, students, and parents of students. The observation method is used to observe important research objects that will enrich the research data. Data were analyzed using qualitative descriptive analysis techniques. Descriptive analysis is used to fully explain the strengthening of science learning based on certain criteria/indicators. Measurement to which the objectives of the program/activity implementation have been achieved is used as a consideration in making a policy or decision.

Results and Discussion

Science concept

Science literally means the study of nature or the study of events that occur in nature (Patta, 2006). Einstein (in Zakky, 2021) defines science as a form of effort or activity that allows various variations or sensory experiences to form a system of thought or thought patterns that are rationally uniform. Some experts (Mariana & Praginda (2009), Holton & Roller (2000), Purwanto (2015), Zuhri (2017)) interpret science not only as mastering collections of knowledge in the form of facts, concepts, principles but also a process of discovery that can be observed with the five senses and tested through the scientific method.

The nature of science is universal, meaning that it is done anywhere, by anyone, and at any time, it will basically get the same result. Science must also be logical and systematic, and research conducted objectively and empirically.

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Thus, science learning is not only about product learning, but also must learn process and attitude aspects so that students can truly understand science as a whole. Learning science is something that must be done by students, not something that is done to students. Science learning requires students to learn actively which is implied in physical or mental activities, not only including hands-on activities but also minds-on (Trianto, 2011).

In relation to learning programs, science can be developed into three basic substances, namely science education and learning that facilitates the mastery of the science process, mastery of science products and programs that facilitate the development of scientific attitudes. First, science as a process is a method for acquiring knowledge. The series of processes carried out in these scientific activities are currently known as the scientific method. Second, science as a product consists of various facts, concepts, principles, laws and theories. And third, science as an attitude, or known as scientific attitude, means various beliefs, opinions and values that must be maintained by a scientist, especially when seeking or developing new knowledge. Amongst the attitudes are high responsibility, curiousity, discipline, diligent, honest, and open minded (Toharudin & et al, 2011).

Context of Science-Learning Strengthening

Strengthening of learning is part of the teacher's behavior modification toward student behavior that can increase the possibility of repeating the behavior and students will be encouraged to provide feedback (positive responses) (Nurhasnawati (2005); Asril, (2010); Sanjaya, (2008).), Hasibuan & Moedjiono, (2010), and (Prayitno, 2009)). The context of strengthening science learning in madrasas includes advances in science and technology, globalization, community values and expectations which are formulated in the vision, mission, and goals and policies of the madrasa. In addition, the demands for self-development and opportunities for graduates to continue or enter the community are also part of the context.

MAN 1 Yogyakarta is a madrasa that has been designated as an Excellent Madrasa Pioneer based on the Decree of the Head of the Regional Office of the Ministry of Religion of the Special Region of Yogyakarta Number 609 b of 2012. Along with the achievements, both at national and international levels, and the achievement of an Accreditation score of 98.00 in 2018 MAN 1 Yogyakarta is recognized as an Excellent Madrasa. The advantages mentioned include excellence in academics, research, and

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tahfidz with the slogan "Unstoppable Achievement, Intelligent and Islamic".

One of the things which leads madrasas to strengthen science learning can be seen from the madrasa vision indicator, namely "SCIENTIFIC". The goal to be achieved is to be able to produce young researchers who are strong and reliable, able to produce innovative and effective works, and win youth scientific competitions. At first, science learning was only part of students' extracurricular activities, namely the National Science Competition and Youth Scientific Work. Seeing the positive impact on science learning, especially Youth Scientific Work, it is then integrated into the subjects of Craft and Entrepreneurship Education. In the Academic Year 2020/2021, it becomes a separate subject, namely Research- the local content. Meanwhile, National Science Competition and Madrasa Science Competition are in the Academic Class.

This policy of strengthening science learning is the result of deliberation between the principal of the madrasa with teachers, committees, and madrasa stakeholders. This is because this program does not only involve the madrasa but also outside parties. The purpose of this science learning program is to develop a scientific-based learning process, improve learning outcomes every semester, increase madrasa test scores, both at local and national levels, increase the percentage of students accepted in State Universities and favorite Private Universities, make madrasas that excel in National Science Olympiad and Madrasa Science Competition at the national level, and make madrasas that excel in the field of research in the national and international levels.

The principal of the madrasa is very responsive in developing science learning. This is shown by his policy to provide activities for developing and strengthening science by compiling the curriculum of educational unit in research and science for local contents and extracurricular activities. If you look at the class comparison, there are more science classes compared to social studies, language, and religion (4:3:2:1). The allocation of funds is prepared for science learning, such as the procurement of complete infrastructure (Laboratory) and funds for incentives for both inrenal and external competent supervisors such as qualified lecturers and alumni. The principal also supports to provide experts in science and also collaborates with various institutions such as Universities in China and Malaysia, universities in Yogyakarta, namely UGM, UNY, UIN Sunan Kalijaga, UII, UAD, Amikom, Ist Akprin, UST and several agencies in developing the competence of teachers and students.

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The input of Science Learning

Input is all the potencies inserted into the school as the initial capital for the school's educational activities. Input of Madrasa is everything needed in the implementation of education, especially in the teaching and learning process. The input components can be divided into two, namely the processed input and the input processor. The processed inputs are students, while the input processors are vision, mission, goals, targets, curriculum, teachers and staff, funds, facilities and infrastructure, and cooperation, as well as the role of the community.

The vision of MAN 1 Yogyakarta in 2020/2021 is Excellence, Scientific, Amaliyah, Worship and Responsible (ULIL ALBAB). The realization of Madrasa graduates who excel in faith – piety, science and technology, think scientifically, able to practice religious teachings, worship diligently, be responsible in social life and environmental conservation. One of the backgrounds for madrasa to strengthen science learning can be seen from the madrasa vision indicator, namely "SCIENTIFIC". The goal to be achieved is able to produce strong and reliable young researchers, able to produce innovative and effective works, and win youth scientific competitions. Science learning was initially part of students' extracurricular activities, namely National Science Competition and Youth Scientific Work. Considering the positive impact on science learning, especially Youth Scientific Work, it is then integrated into the subjects of Craft and Entrepreneurship Education. In academic year of 2020/2021, it is a separate subject, namely the local content of Research. Meanwhile, there is an Academic Class for National Science Competition and Madrasa Science Competition.

Curriculum. The curriculum is a system of learning programs to achieve institutional goals in educational institutions, so that the curriculum plays an important role in realizing quality schools. According to Ahmad Tafsir (Sugiana, 2019) curriculum does not only contain lesson plans or fields of study, but everything that actually happens in the educational process. MAN 1 Yogyakarta uses the 2013 Curriculum and for religious lesson, it uses the Curriculum of Indonesian Ministry of Religion. The curriculum development of MAN 1 Yogyakarta is based on the National Education Standards to ensure the achievement of national education goals. National Education Standards consist of Graduate Competency Standards, Content Standards, Process Standards, Educational Assessment Standards, Educators and Education Personnel Standards, Infrastructure Standards, Management Standards, in line with the Basic Framework and Structure of

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the Madrasa Curriculum. In academic year 2020/2021, MAN 1 Yogyakarta fully applies the 2013 curriculum for grades X, XI and XII. The strengthening of the curriculum is supported by mastery of IT and quality improvement of faith and piety. The e-learning system uses internet media.

Materials for strengthening science learning include: (1) Material deepening for science and social students, the material is in accordance with compulsory subjects; (2) Research material deepening: Applied Research, Life and basic Science Research, Technology Research and Robotics; (3) Local content Research: Introduction of research methods through digital literacy, literature, and direct observation in the field; and Extracurricular activities consisting of: (a) Youth Scientific Work (YSW), Robotics and Journalism, training materials for writing scientific papers, robotic programmers, and scientific publications; (b) Science Olympiad, practice materials and question enrichment for the preparation of science olympiad competitions (National Science Competition (NSC)/Madrasa Science Competition(MSC) for Physics, Chemistry, Biology, ITC, Economics, and Geography subjects; and (c) Scientific Writing and Literacy, training materials for writing scientific papers, fiction and non-fiction book reviews.

Educators and education staff. The existence of educators and education staff for science learning is very important, both in terms of adequacy, qualifications and competencies. From 59 teachers who teach at MAN I Yogyakarta, as many as 17 teachers are given additional tasks to carry out the strengthening activities for science learning, both in deepening material subjects, and extracurricular activities. Teachers of science strengthening subjects consist of: 2 Biology teachers, 2 Physics, 3 Chemistry, 5 Mathematics, 1 Computer, 2 Geography, 1 Economics, 1 YSW. While the number of external staff are 23 people consisting of lecturers and alumni of MAN I Yogyakarta.

Science teaching staff (NSC and MSC) come from internal and external sources with a recruitment mechanism based on assessments from the Principal of Madrasa, Vice Principal of Curriculum, Vice Principal of Student Affairs and Coordinator of NSC/MSC by looking at the ability to master the material, the ability to foster and motivate, performance and experiences. External teachers are experts who have been coaches and are generally lecturers, while internal teachers are taken from teachers who meet the requirements and get an assignment decree. 75% of teachers come from internal madrasa, have master's degree education, and are active in the Subject Teachers' Conference (MGMP). In addition, he also participated

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in training carried out by the Ministry of Religion and the Ministry of Education and Culture and several institutions providing guidance.

Learners. The number of students in academic year of 2020/2021 is 605 students who are divided into 24 classes as follows: 12 classes of science students, 6 classes of social students, 3 classes of language students, and 3 classes of MANPK students. . Meanwhile, the number of students participating in science extracurricular activities is 180 students consisting of 39 biology students, 25 physics students, 28 chemistry students, 20 computer students, 15 geography students, 42 mathematics students, and 12 geology students.

The student recruitment system in science learning is based on the choice of specialization, Score of semester 1, 3, and 5 MTs/SMP for Indonesian language, English, Science and Mathematics, Psychological Test results, Class capacity, and integrity pact. Meanwhile, the recruitment of extracurricular activities in the field of science (NSC/MSC/YSW) goes through several stages such as filling out a questionnaire by prospective guidance participants where each student may only choose 2 subjects, recommendations from subject teachers, active student participation in routine guidance 2 times a week, and participating in try outs (the results of the try out are used to determine which students can continue guidance). The results of the initial recruitment of participant guidance can reach between 20 - 40 students, but later after the process there are only 6 - 8 students who continue for intensive coaching. While, for YSW recruitment activities, it is carried out by making an essay, then the essay is presented in front of a selection team consisting of alumni, trainers and YSW coaches. The selected participants are those who pass the presentation and also have commitments.

The motivation of students in participating in science learning is willingness to develop and improve their talents and interests, which since MTs/Junior High School have been active in science learning. Another factor is the support of his parents who are lecturers who have robotic abilities that are taught to their children. In addition to these two factors, there are other factors that motivate students to take part in science learning, namely looking for challenges and self-development, hobbies, and the influence of friends.

Support of Infrastructure for Science Learning Strengthening activities. Besides teaching staff, facility and infrastructure are very important supporting factors in the world of education. Facilities are all equipment, materials, and furniture that are directly used in the teaching

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and learning process in schools, both movable and immovable so that the achievement of educational goals can run smoothly, regularly, effectively and efficiently. (Mustari, 2014). While educational infrastructure is all basic equipment that indirectly supports the implementation of the educational process in schools (Darmawan, 2014). Infrastructure facilities that support activities to strengthen science learning in madrasas include: representative classrooms, meeting rooms and halls equipped with LCD projectors so that they can be used for regular, special and classical learning. In addition, there is also a gazebo that can be used for learning outside the classroom. There is also an Integrated Laboratory building which includes PAI, Chemistry, Physics, and Biology laboratories. The existing library is also representative with computer facilities for internet access and also a group of science books. Besides that, there are also computer laboratory facilities and internet hot spot areas.

Learning Fund Sources. Sources of funding for strengthening science learning come from the Madrasa Budget (DIPA), APBD, and the Madrasa Committee (early student funds). Funds are also obtained from donors and other parties who are not binding. For research programs or competitions, the fee is 50% from the madrasa, 50% independent. The incentives for teachers/supervisors are entirely from DIPA BOS and the Committee. For coaching outside of the teaching and learning process, overtime calculated for PNS/teacher coaches is Rp. 30,000.00/meeting while alumni are given transportation fee of Rp. 60,000/once coming. For experts from tutoring institutions or lecturers between Rp. 200,000 - 500,000.00/meeting depending on ability.

Support or cooperation with the community. Community support is realized in the form of collaboration with madrasa committees, alumni, universities, the Education Office, and the private sector. Support from parents/madrasa committees includes: as representatives of parents/guardians for student achievement improvement programs, donors in supporting learning activities through BOPM which are given every year and Madrasa development contributions (SPMA) given at the beginning of students entering the school, as madrasa partners in the preparation of the RAPBM, as madrasa partners in coaching learning, student activities and learning resources, and as madrasa partners in guiding and educating students to achieve the vision and mission of MAN I Yogyakarta.

Cooperation between madrasas and alumni of MAN I Yogyakarta (MAN I Alumni Forum) or PHIN alumni includes the development of

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madrasa infrastructure facilities such as mosque construction or participation of MAN I and PHIN alumni, motivators and aspirators for students in the form of pride and confidence as MAN I students, speakers in learning activities, and trainers for extracurricular activities

In 2016 MAN I established an alumni association organization named Al Hakim Scholarship engaged in the social sector by collecting funds from alumni with the "100 thousand per alumni per year" movement. This movement is very helpful for madrasas in the form of providing scholarships for outstanding and needy students. It also provides assistance and support for the progress of MAN I Yogyakarta.

MAN I Yogyakarta, which is located in the city of Yogyakarta, makes it easy to access information from and to universities. Cooperation carried out with universities includes information on further study to universities, places for conducting field study for students as prospective teachers from universities, partners for madrasas as a source to improve teacher or student competence in the form of training and comparative studies, places for conducting paper or thesis research, and university lecturers become speakers for improving the human resources of teachers or students.

Cooperation with the Education Office of Yogyakarta or with the province, such as, in the admission system for new students and madrasa participation in activities organized by the Education Office such as MKKS, MGMP, or participating in training organized by the Office, becoming committees in competitions organized by the Education Office to improve the competence of teachers and students, active participation of students in OSN, OPSI, Paskibraka PKPO, and others, and the MANSA campus is the place for activities organized by the Education Office.

MAN I Yogyakarta in cooperating with the private sector is carried out with the principle of not harming in learning activities and can increase the participation of teachers, students and madrasas. The collaborations carried out included giving UN tryouts from learning tutors (Primagama, Neuton, SSc, and GO), becoming speakers in activities organized by madrasas, several privately sponsored student activities promoting their products, and using an integrated information system (SIFOSTER). via cell phone service.

Science Learning Process

The learning process is a process in which there are interaction activities between teacher-students and reciprocal communication that takes place in educational situations to achieve learning goals. (Rustaman,

2001). Learning as an activity process, consists of three phases or stages, namely planning, implementation, and evaluation.

Learning planning is a process that is arranged in such a way according to certain steps in the form of preparation of teaching materials, use of media, and other learning models intended for optimal implementation. In NSO/MSC guidance activities, the teacher or supervisor does not specifically make a Lesson Plan. The teacher uses the NSO/MSC syllabus and develops the material independently by finding learning resources and making learning media according to the needs in science learning and the targets to be achieved. However, for research learning activities, lesson plans are made because this activity is included in local content activities (1 lesson hour) and material deepening activities (6 lesson hours).

The learning process at MAN 1 Yogyakarta starts at 07.00 AM – 03.00 PM and lasts for five days (Monday to Friday). Meanwhile, science strengthening learning begins after the teaching and learning activities are completed, starting at 03.30 to 05.00 PM. The frequency of additional hours of science learning strengthening at MAN I Yogyakarta can be seen as follows: (1) Mathematics and Natural Sciences Academic Class, additional learning hours for deepening Physics, Chemistry, Biology, 2 lesson hours each; (2) Social Studies Academic Class, additional study hours for deepening Economics, Sociology, Geography, 2 lesson hours each; (3) Mathematics and Natural Sciences Research Class, additional study hours for deepening Applied Research, Life and Basic Science Research, Technology and Robotic Research, 2 lesson hours each; (4) Local content Research, 2 lesson hours for class X and all classes for majors MAN PK; (5) Extra Curricular: YSW, Robotics, Journalism, Science Olympiad, Scientific Writing and Literacy. It is held twice a week after the teaching-learning process is finished or as needed. For NSC and MSC, the learning strategy is to provide material followed by hots questions. It is more advisable for students to find and solve problems independently. Every 2 months a try out is held to measure and simultaneously select the level of material achievement. Two weeks before the competition, intensive guidance is carried out by quarantine and inviting experts. For science learning KIR, guidance is carried out in writing scientific papers, from the process of how to find problems, formulate, find reference sources and practice or simple experiments; and (6) Laboratory Practice. It is carried out in class during KBM (3 – 4 times per semester as needed. If there is a competition, it is carried out intensely after KBM as needed, especially before the

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competition. For YSW, science learning guidance is carried out in writing scientific papers, from the process of how to find problems, formulate, find reference sources and practice or simple experiments; and (6) Laboratory Practice. It is carried out in class during teaching-learning process (3 – 4 times per semester as needed. If there is a competition, it is carried out intensely after teaching-learning process as needed, especially before the competition.

The strengthening activities of science learning are carried out in intracurricular hours because it includes local content activities and material deepening. Meanwhile, NSO activities and laboratory practices are carried out outside of teaching-learning hours, with an allocation of 1.5 hours. From the allocation, the material is divided into approximately 30 minutes, and 1 hour for practice questions. Assignments and reflections are carried out independently by students. The approach is scientific, by prioritizing students to be independent.

In the implementation of this learning the teacher's role is to be a facilitator and motivator. As a facilitator, the teacher provides facilities or easiness in the teaching and learning process, for example by creating an atmosphere of learning activities in such a way, in harmony with student development, so that teaching and learning interactions will take place effectively. (Sardiman, 2010). Through active learning, teachers facilitate learning that takes place in students, so that they gain real and authentic learning experiences. This means that the teacher tries to invite and bring all students to participate. The teacher is also a motivator for students to have an orientation in learning. The role of the teacher as a motivator is important in increasing the enthusiasm and development of student learning activities. The teacher provides stimulus and encouragement as well as reinforcement to dynamize the potential of students, foster self-reliance (activity) and creativity, so that it will become a dynamic in the teaching and learning process. The teacher's role as a motivator is very important in teaching and learning interactions, because it involves the essence of educating work that requires social skills, dealing with performance in term of personalization and self socialization (Sardiman, 2010).

The role of parents is also very important, especially in supporting students to give confidence to take part in science learning outside the teaching-learning process and sometimes outside study hours. In addition, support is in the form of independent funds to support competition activities. While support from other institutions exists, for example in

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licensing, being a place for research, and support for student achievement. Support is also in the form of collaboration with alumni, even they voluntarily contribute to training and coaching. In addition, there is also cooperation with PT or Lembijar to overcome the limitations of facilities and infrastructure as well as expert speakers.

After the learning process is complete, the teacher's activity is to evaluate the learning process that has been carried out. Evaluation is a tool to measure the achievement of goals. With evaluation, the quantity and quality of the achievement of learning objectives can be measured. On the other hand, because evaluation is a measure of the achievement of goals, the benchmark for planning and development is learning objectives. The implementation of assessment activities and distribution of learning results or report which are regulated in the education calendar.

Meanwhile, specifically for science learning strengthening activities, there is an assessment system that is included in intracurricular and extracurricular activities. For YSW in intracurricular, it is in local content Research, while NSC-MSC is in material deepening. Types of assessment are: activeness, creativity, innovation, try out results, award and character. Assessment is based on observations, projects, products, and portfolios. Time of assessment is at the end of the semester, carried out by coaches and guides. Benefit of assessment is to evaluate science learning programs, both in terms of students, materials, trainers and coaches as well as the system used

Output

Output is the result achieved from a program, activity, and policy. In education, output is learning outcomes as formulated in learning objectives in the form of behavioral qualifications expected to be mastered by students after participating in learning interactions (Saputro (2005)[1]. Output is measured from academic achievement and non-academic achievement.

In the academic field, the outputs include the achievement of national exam scores, students continuing to college, and competitions in the academic fields of NSC, MSC and subjects. The achievement of the National Examination scores in the provincial and the national level among Madrasa Aliyah (MA) is quite good. For the general level of the province, on average it gets the first or second rank for the Language and Culture Program and the Religion/MANPK program. Meanwhile, for science and social programs are ranked 20 to 30 on average. For Madrasa national level, MAN

[1]Saputro, Suprihadi et al. 2005. Learning Strategy. Malang: UM Press.

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1 Yogyakarta is in the fifth rank in the acquisition of National Examination scores.

For competitions in the academic field, especially the National Science Olympiad and the Madrasa Science Competition, every year there are winners in the provincial and national levels. As a research madrasa, MAN I Yogyakarta has shown achievements by winning research competitions in national and international levels including the acquisition of gold medals at the Indonesian Student Research Olympiad (OPSI), MYRES, and LKIR finalists as well as silver medals at the Malaysian Technology Expo (MTE), bronze medals in the robotics competition in the application category in Putra University Malaysia, 3rd place in the International Exhibition For Young Inventors, and 1st place in Robotic Creative at IRC IIUM Malaysia.

Scientific Writing has become additional material in the development of Craft and Entrepreneurship materials, as well as KIR LIBA extracurricular encouraging achievements in the field of research. In addition, MAN 1 Yogyakarta also has a writing teacher community called the Nubar MANSA community. This community is engaged in teacher writing, both fiction and non-fiction. One of the latest works from the Nubar MANSA teacher community is the publication of the book "Learning From Corona" which tells about the Inspirational Story of MANSA teachers in dealing with Covid-19. In the same year, the teachers of MAN 1 Yogyakarta were in the process of publishing the 2nd Book in commemoration of Teacher's Day.

For scientific publication activities, several works of madrasa students have been published in the scientific journal Sagasitas belonging to the DIY Diaspora, including: (1) Tech-Boot Exclusive Lesson Toy For Teenager by Rahmat Munir Hasan, Vol 15, No.1, October 2019; (2) Utilization of Waste Cooking Oil as an Alternative Source of Bioavtur Through Zeolite Catalyzed Treansesterification Process, by Rahmat Munir Hasan and Az-Zuhida, Vol 15, No.1, October 2019; (3) Mbatiq: An Internet Of Things-Based Automatic Batik Night Patterning Tool, by Rahmat Munir Hasan and Enrico Olivian Maricar, Vol 15, No.1, October 2019; and (4) Mapping of Microplastic Content in Sand and Dominant Fish Catches by Fishermen Along the South Coast of Bantul Yogyakarta, by Royhan Ikbar and Muhammad Ibnu Pratista, Vol15, No.2, November 2019.

Conclusions

The success of MAN 1 Yogyakarta in learning science can be seen from the context, input, process, and output. In terms of context, firstly, the

strengthening of science learning has been stated in the vision and mission of the madrasa, namely having the advantages of science and technology. Secondly, madrasa policy to provide scientific development and strengthening activities by compiling Research and Science Curriculum of Education Unit for local content and extracurricular activities.

From the input side, all were fulfilled except for the laboratory staff who were temporarily carried out by the YSW Trustees. From the process side, the strengthening of science learning has been going well and the output is also quite satisfying. This can be seen from the value of the National Examination and the number of student achievements, especially in the fields of science and research, both in the national and international levels.

Suggestions

Based on the conclusions above, the government needs to make special policies for strengthening science learning in madrasas in order to welcome the 4.0 era. This policy needs to be followed up with the preparation of Guidelines for Strengthening Science Learning in Madrasa. In addition, madrasa that excels in science learning need to be improved in quality with supporting facilities for science learning, especially laboratory staff.

References

(biem.co), B. (2019). Kemdikbud Rilis Daftar 100 SMA Negeri dan Swasta Terbaik di Indonesia. Jakarta. Retrieved from https://www.biem.co/read/2019/06/20/42135/kemdikbud-rilis-daftar-100-sma-negeri-dan-swasta-terbaik-di-indonesia/

Darmawan, B. (2014). Manajemen Sarana Dan Prasarana Dalam Meningkatkan Kualitas Pendidikan. Pelopor Pendidikan, 6, 94–102.

Ghony, M. D., & Almanshur, F. (2016). Metode Penelitian Kualitatif. Yogyakarta: Ar-Ruz Media.

Harususilo, Y. E. (2019a). Skor PISA Terbaru Indonesia, Ini 5 PR Besar Pendidikan pada Era Nadiem Makarim.

Harususilo, Y. E. (2019b, February 9). Kompetisi Sains Madrasa, Membongkar Stigma "Sekolahan Kelas Dua." Kompas.

Islam, D. P. (2019). Integrasikan Sains dan Islam Untuk Madrasa Hebat. Jakarta. Retrieved from

http://www.pendis.kemenag.go.id/index.php?a=detil&id=10575#.YG52ST8xU2w

Milyasari. (2013). Problematika Pembelajaran Sains Ditinjau Dari Aspek Guru. Al Ta'lim, 20, 346–356. https://doi.org/https://doi.org/10.15548/jt.v20i1.30

Mustari, M. (2014). Manajemen Pendidikan. Jakarta: Rajawali Pers.

Nurul, Z. (2015). Metodologi Penelitian Sosial dan Pendidikan. Jakarta: PT. Bumi AKsara.

Patta, B. (2006). Penilaian Ketrampilan Proses dan Sikap Ilmiah dalam Pembelajaran Sains SD. Jakarta: Depdiknas.

Rustaman, N. (2001). Ilmu dan Aplikasi Pendidikan. Bandung: Inperial Bakti Utama.

Sardiman, A. . (2010). Interaksi dan Motivasi Belajar Mengajar. Jakarta: Rajawali Pers.

Sari, M. (2012). Usaha Mengatasi Problematika Pendidikan Sains Disekolah Dan Perguruan Tinggi. Al Ta'lim, 19, 74–86. https://doi.org/https://doi.org/10.15548/jt.v19i1.9

Sugiana, A. (2019). Pengembangan Kurikulum Pendidikan Agama Islam Dan Implementasinya Di MTs Nurul Ummah Yogyakarta. Jurnal Pendidikan Agama Islam, XVI(1), 161–162. https://doi.org/10.14421/jpai.jpai.2019

Sukmadinata. (2010). Metode penenelitian pendidikan. Bandung: Remaja Rosdakarya.

Toharudin, & Dkk. (2011). Membangun Literasi Sains Peserta Didik. Bandung: Humaniora.

Trianto. (2011). Model Pembelajaran Terpadu Konsep Strategi Dan Implementasinya Dalam Kurikulum Tingkat Satuan Pendidikan. Jakarta: Bumi Aksara.

Wijayanto, N., & Wibowo. (2006). Potret Pembelajaran Sains Di SMP Dan SMA. Jurnal Pendidikan Fisika Indonesia, 4. https://doi.org/10.15294/jpfi.v4i2.170

DOI: https://doi.org/10.14421/jpai.2021.181-03

Zakky. (2021). Pengertian Sains : Arti, Definisi, Tujuan, dan Hakikat Ilmu Sains.

DOI: https://doi.org/10.14421/jpai.2021.181-03